Medtronic

Clinical Evidence Guide

Improve intubation success with McGRATH™ MAC videolaryngoscope (VL)

Routine use of the McGRATH™ MAC video laryngoscope (VL) improves first-pass success rate,[10-13] reduces difficult intubation[24] and lessens hemodynamic response to intubation,[17-19] when compared to the traditional direct laryngoscopy (DL) technique. McGRATH™ MAC VL provides better glottic views,[27] with a familiar Macintosh blade, making your first attempt your best attempt. McGRATH™ MAC VL is cost effective compared to other VL devices[14] and with greater first attempt success, it reduces the costs associated with a difficult intubation.

Benefits associated with McGRATH™ MAC video laryngoscopy and related evidence

Benefit	Evidence
Video laryngoscopy guidelines	• Summary of recommendations
Increased first-pass success rate	• Kriege et al. EMMA Trial • Kriege et al. LARA Trial • Taboada et al. VIDEOLAR-CAR Study • Taboada et al. VIDEOLAR Study
Cost effective	• Thaler et al. • Moucharite et al. • Zhang et al.
Less hemodynamic instability	• Altun et al. • Yokose et al. • Ketata et al.
Increased utilization	• Samuels et al. • Granell et al.
Avoid difficult Intubations	• Hansel et al. • De Jong et al. 2022
Improved performance compared to other video laryngoscopes	• De Jong et al. 2021 • Alvis et al. • Cabakli et al.

Review the evidence of the benefits associated with McGRATH MAC™ videolaryngoscopy

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Video laryngoscopy guidelines

Society	Guidelines	Recommendation
Difficult Airway Society (DAS)	Difficult Airway Society 2025 guidelines for management of unanticipated difficult tracheal intubation in adults[1]	A videolaryngoscope should be used first line to facilitate tracheal intubation whenever possible.
The European Journal of Anaesthesiology (EJA), The Airway Section of the Spanish Society of Anaesthesiology, Resuscitation, and Pain Therapy (SEDAR), the Spanish Society of Emergency Medicine (SEMES), the Latin American Federation of Emergency Medicine (FLAME) and an international group of airway experts (IAG)	Guidelines on strategies for the universal implementation of videolaryngoscopy[2] - 2025	Routine use of videolaryngoscopy over direct laryngoscopy as the primary device for tracheal intubation is recommended.
European Society of Anaesthesiology and Intensive Care (ESAIC) and British Journal of Anaesthesia (BJA)	Airway management in neonates and infants[3] - 2024	We recommend the use of a video-laryngoscope with an age-adapted standard blade (Macintosh or Miller) as first choice for tracheal intubation of neonates and infants, including for tracheal intubation in the lateral position.
Canadian Airway Focus Group (CAFG)	Updated consensus-based recommendations for management of the difficult airway: part 1. Difficult airway management encountered in an unconscious patient[4] - 2021	Recommends the routine use of video laryngoscopy (with appropriately selected blade type) for tracheal intubation, with or without anticipated difficulty.

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American Society of Anesthesiologists (ASA)	2022 American Society of Anesthesiologists Practice Guidelines for Management of the Difficult Airway[5]	Ensure that airway management equipment (including video laryngoscope) is available in the room.
Project for Universal Management of Airways (PUMA)	Preventing unrecognized esophageal intubation: a consensus guideline from the Project for Universal Management of Airways and international airway Societies[6] - 2022	Routine use of a video laryngoscope is recommended whenever feasible.
Society for Airway Management (SAM)	Difficult airway management in adult COVID-19 patients: Statement by SAM[7] - 2021	Video laryngoscopy is recommended as the first-line strategy for airway management.
Safe Airway Society - Australian Medical Association	Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group[8] - 2020	For clinicians proficient with its use, the routine use of a video laryngoscope is recommended for the first attempt at intubation.
Surviving Sepsis Campaign – Society of Critical Care Medicine (SCCM)	Surviving Sepsis Campaign Guidelines on the Management of Adults with Coronavirus Disease 2019 (COVID-19) in the ICU[9] - 2021	For healthcare professionals performing endotracheal intubation on patients with COVID-19, suggest using video-guided laryngoscopy over direct laryngoscopy, if available.

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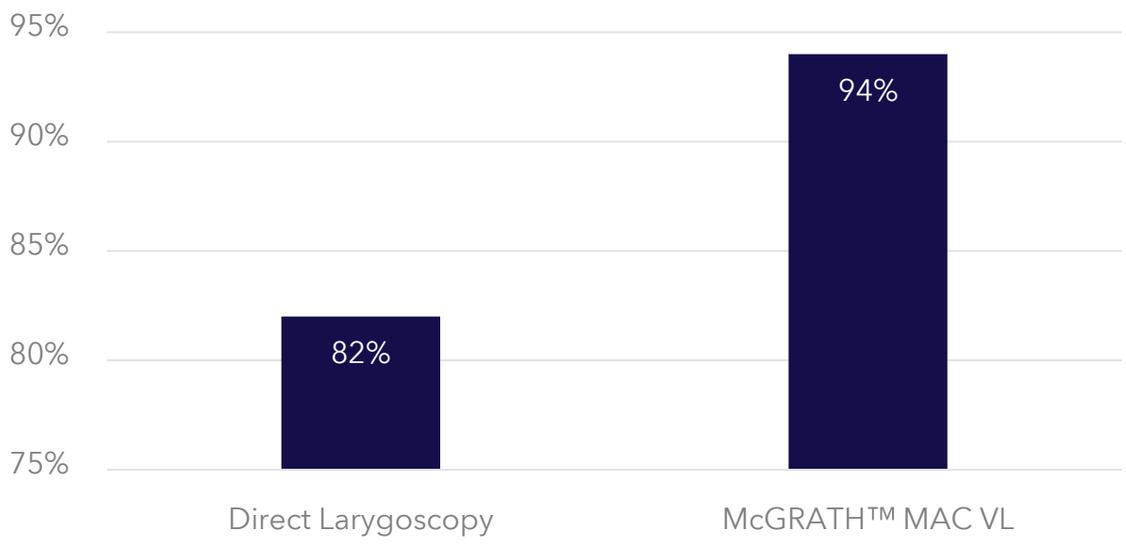
Kriege, M., et al. – EMMA Trial

A multicentre randomised controlled trial of the McGrath Mac videolaryngoscope versus conventional laryngoscopy

Anaesthesia (2023)

Figure 1. First-pass success (FPS) rate in McGRATH™ MAC VL vs Macintosth DL



Study information	
Study design	International, multicenter, randomized, controlled trial
Methods	• 2,092 elective surgical patients at four institutions were randomized to be intubated with either McGRATH™ MAC VL or Macintosh DL • The primary endpoint was first-pass intubation success
Results	• The McGRATH™ MAC VL groups had improved first-pass success rate (See Figure 1) • Among trainees: First-pass success was higher with McGRATH™ MAC VL (93%) than with DL (77%) • Experienced consultants: First-pass success was higher with McGrath™ MAC VL (96%) than DL (90%) • Improved overall intubation success (first and second attempts) using McGrath (99%) compared with DL (96%) • McGRATH™ MAC VL had better glottic views, intubation difficulty scores, less external manipulation and better ease of laryngoscopy scores

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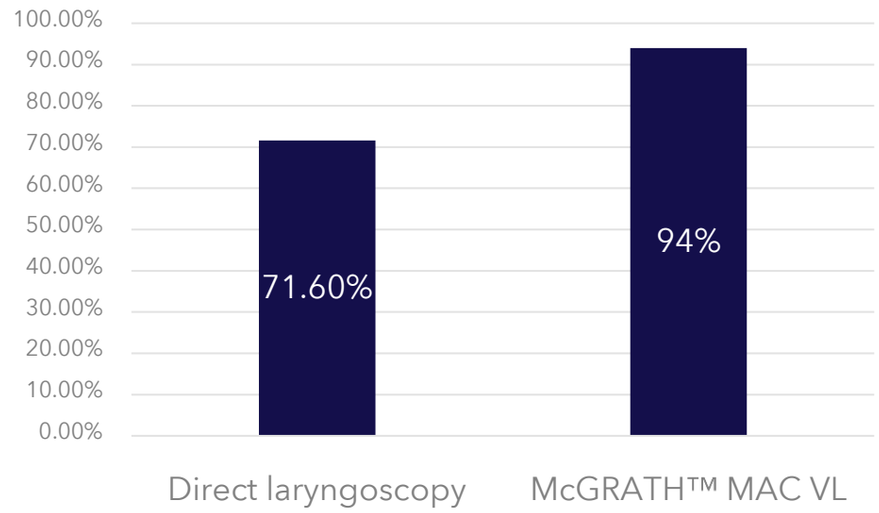
Kriege, M., et al. – LARA Trial

A comparison of the McGrath videolaryngoscope with direct laryngoscopy for rapid sequence intubation in the operating theatre: a multicentre randomized controlled trial

Anaesthesia (2024)

Figure 1. First-pass success (FPS) rate in McGRATH™ MAC VL vs Macintosth DL



Study information	
Study design	Multicenter, randomized, controlled trial
Methods	• 1,000 elective, urgent, or emergency surgical patients at four institutions across Germany were randomized to be intubated with either McGRATH™ MAC VL or Macintosh DL • The primary endpoint was first-pass intubation success
Results	• The McGRATH™ MAC VL groups had improved first-pass success rate (See Figure 1) • Subgroup analyses showed that first-pass tracheal intubation success among trainees was significantly higher using the McGrath videolaryngoscope compared with direct laryngoscopy (92.6% vs. 70.5%; $p < 0.001$). • There was a significantly lower incidence of perioperative complications related to tracheal intubation in patients allocated to the McGRATH™ group compared with the direct laryngoscopy group (2.4% vs. 12.2%, respectively; $p < 0.001$). • McGRATH™ MAC VL was associated with a significantly lower time to glottic view, time to tube placement, time to ventilation, intubation difficultly score, and percentage of patients with an intubation difficulty score <5.

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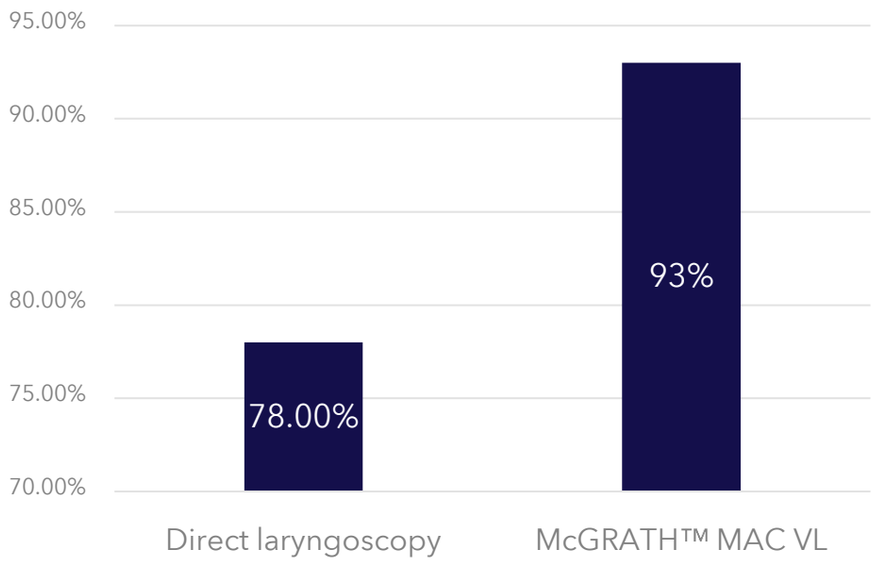
Taboada, M., et al. – VIDEOLAR-CAR Study

Impact of Universal Use of the McGrath Videolaryngoscope as a Device for All Intubations in the Cardiac Operating Room

Cardiothorac Vasc Anesth (2024)

Figure 1. 'Easy'* intubation rate in McGRATH™ MAC VL vs Macintosth DL



*"Easy" intubation was defined as successful first attempt, a modified Cormack-Lehane grade of 1 or 2a, AND no need for adjuvant airway devices.

Study information	
Study design	Conducted at eight hospitals in north-west Spain Prospective before-after study design consisting of two consecutive phases where the first option for intubation was • Macintosh direct laryngoscopy - preintervention phase • McGRATH™ MAC video laryngoscopy - intervention phase

Methods	• 1,109 cardiac surgery patients
	  • 801 during the preintervention phase and
	  • 308 during the intervention phase

Results

	McGRATH™ MAC VL	Direct laryngoscopy
"Easy"* intubation	93%	78%
First-attempt success	98.7%	94.1%
Difficult laryngoscopy	3.9%	19.6%
Moderate or difficult intubation	1.6%	7.1%

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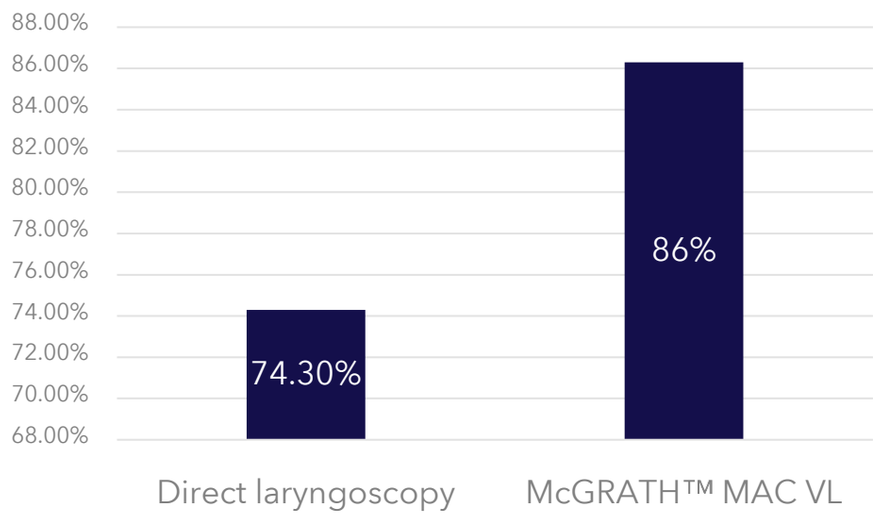
Taboada, M., et al. – VIDEOLAR Study

Universal videolaryngoscopy for tracheal intubation in the operating theatre: A prospective non-randomized clinical trial

Anaesthesia (2025)

Figure 1. 'Easy'* intubation rate in McGRATH™ MAC VL vs Macintosth DL



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Study design	Conducted at eight hospitals in north-west Spain Prospective before-after study design consisting of two consecutive phases where the first option for intubation was • Macintosh direct laryngoscopy - preintervention phase • McGRATH™ MAC video laryngoscopy - intervention phase

Methods	• 5,135 patients were included in the study:
	  • 2,568 during the preintervention phase and
	  • 2,567 during the intervention phase

Results

	McGRATH™ MAC VL	Direct laryngoscopy
"Easy"* intubation	86.3%	74.3%
First-attempt success	91.6%	85.8%
Difficult laryngoscopy	7.2%	17.2%
1 or more complications	5.5%	9.7

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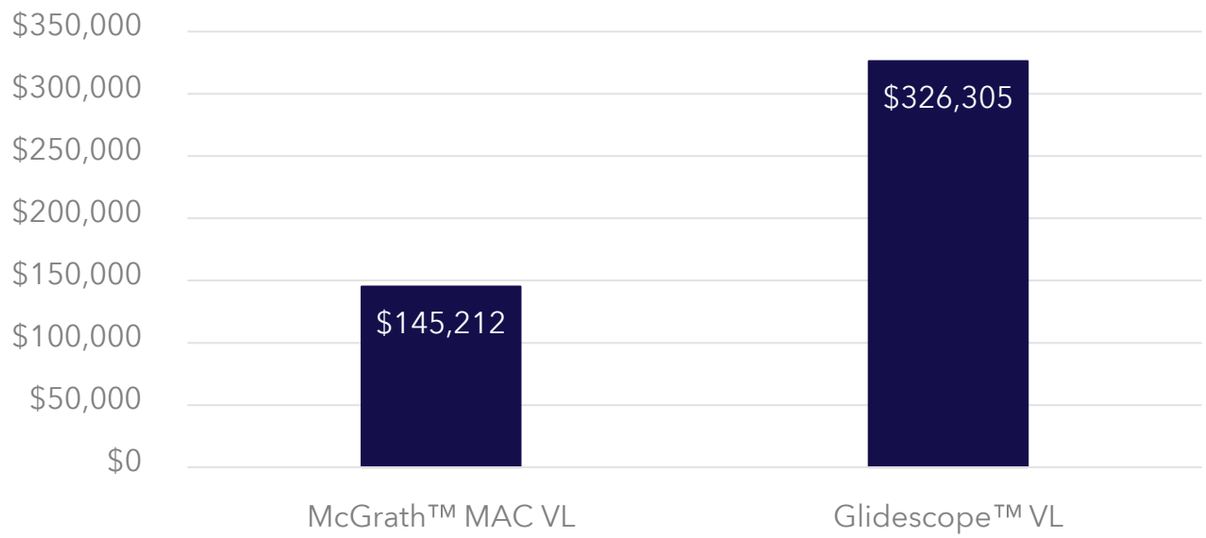
Thaler A et al.

Cost Comparison of 2 Video Laryngoscopes in a Large Academic Center

Journal of Clinical Outcomes Management. 2021;28(4):174-79

Figure 1. Totals costs over 2-year period with McGRATH™ MAC VL and Glidescope™ VL



Study information	
Study design	Retrospective review of patient records
Methods	• Electronic patient data was recorded from 34,600 intubations performed over 24-month period where McGRATH™ MAC VL and Glidescope™* VL were available for intubation • Frequency of use for each type of laryngoscope, blades used, and equipment costs for use of each laryngoscope were analyzed
Results	• Costs over 24 months were $181,093 lower for McGRATH™ MAC VL compared to Glidescope™ VL • Intubation with McGRATH™ MAC VL resulted in a cost savings of 55% compared to Glidescope™ (Figure 1) • Prior to COVID-19, there was no difference in utilization between the two devices. During the COVID-19 epidemic, McGRATH™MAC VL increased to 61% of cases • This was most likely related to the portability and smaller size of the McGRATH MAC™ VL

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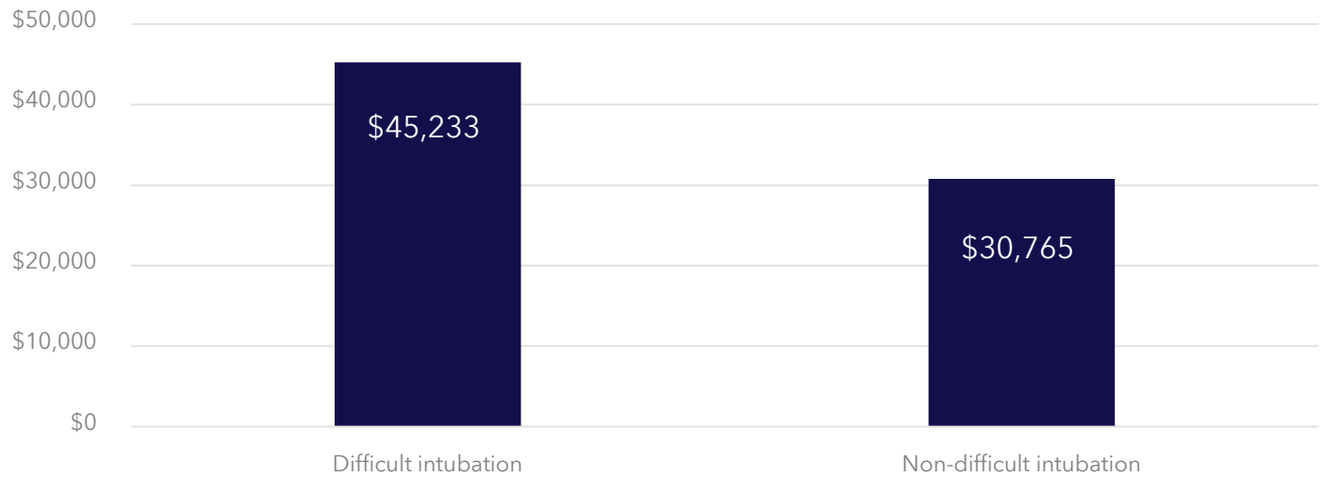
Moucharite MA, et al.

Factors and Economic Outcomes Associated with Documented Difficult Intubation in the United States

Clinicoecon Outcomes Res. 2021;13:227–239

Figure 1. Mean cost of hospital inpatient stay in patients with and without difficult intubation



Study information	
Study design	Retrospective observational cohort study
Methods	• A retrospective observational cohort study was conducted using data from the Premier Healthcare Database. Adult patients with inpatient surgical admissions between January 1, 2016 and December 31, 2018 were selected.

Results	• Patients with difficult intubations have:
	  • Higher mean inpatient costs ($14,468)
	  • Higher intensive care unit costs ($4,029)
	  • Patients with difficult intubations have mean hospital length of stay and ICU length of stay that are substantially higher than patients without difficult intubations (3.8 days and 2.0 days longer, respectively).
	• Obesity, other chronic conditions, and larger hospital size were significantly associated with difficult intubations.

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Zhang J, et al.

Economic analysis of the use of video laryngoscopy versus direct laryngoscopy in the surgical setting

J Comp Eff Res. Jul 2021;10(10):831-844

Inpatient cost for **VL was significantly lower than DL** in eight out of 10 MDC groups, with a cost difference between $1,144 to $5,891 between VL and DL groups.

Study information	
Study design	Retrospective observational cohort study
Methods	• A retrospective observational cohort study was conducted that used three years of data (2016–2018) from the Premier Healthcare Database. • Adult patients who underwent elective surgery in the inpatient setting with at least one hour of general anesthesia and tracheal intubation were included.
Results	• Inpatient cost for VL was significantly lower than DL in eight out of 10 MDC groups, with a cost difference between $1,144 to $5,891 between VL and DL groups. • Compared to the DL group, the average length of stay (LOS) was significantly lower in the VL group in eight of 10 MDC groups. • The likelihood of postoperative ICU admission was significantly lower across all 10 MDC groups, for the VL group vs. the DL group. • Complication rates for pulmonary infection, cardiovascular complications, and respiratory complications, were lower in the VL group vs. the DL group in multiple MDC groups.

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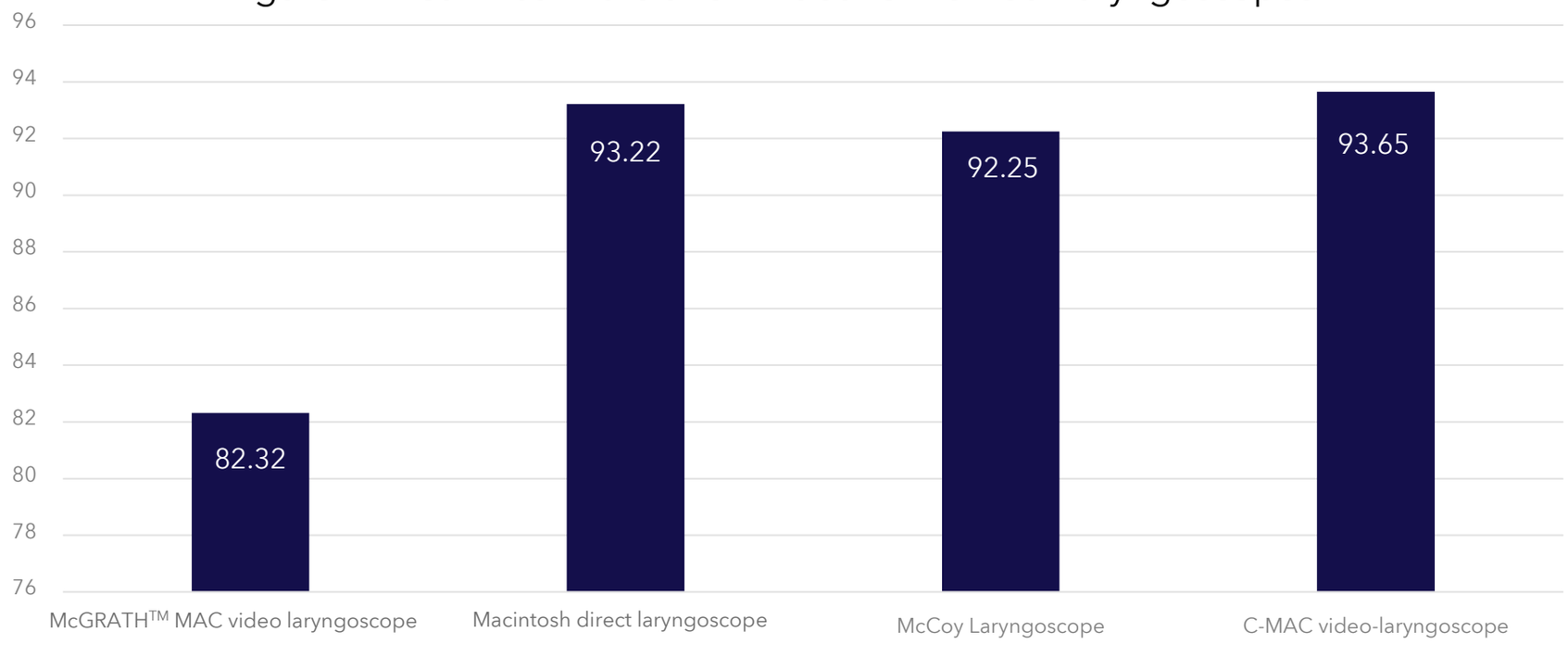
Altun D et al.

Haemodynamic Response to Four Different Laryngoscopes

Turk J Anaesthesiol Reanim. 2018;46(6):434-440

Figure 1. Mean heart rate after intubation for four laryngoscopes



Study information	
Study design	Prospective, randomized controlled trials
Methods	160 ASA status I-II otologic and rhinologic surgery patients were randomized to be intubated with one of following devices: • Macintosh DL • McCoy™ indirect laryngoscope • C-MAC™ VL • McGRATH™ MAC VL • Patients with features associated with difficult airway were excluded.
Results	• Fluctuations in heart rate and systolic blood pressure associated with laryngoscopy and intubation were less in McGRATH™ MAC VL group than the other three device groups • Patients in the McCoy™ and McGRATH™ MAC VL group had fewer moderate and severe sore throats than the other two groups • Time to intubation was shorter in the McGRATH™ MAC VL group compared to the other three groups

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Yokose M et al.
Effect of the McGRATH MAC Video Laryngoscope on Hemodynamic Response during Tracheal Intubation: A Retrospective Study.
PLoS One. 2016;11(5):e0155566.

Patients intubated with the McGRATH™ MAC VL were **57%** less likely to suffer hypertension than patients intubated with a Macintosh DL.

Study information	
Study design	Retrospective trial
Methods	• 360 patients who were intubated with either McGRATH™ MAC VL or Macintosh DL were retrospectively identified. • Patients requiring multiple intubation attempts were excluded. • Because patients intubated with McGRATH™ MAC VL were higher risk patients, the likelihood of patients treated with each laryngoscope to suffer hypertension was adjusted according to 16 variables that could potentially influence the incidence of hypertension.
Results	• 18% of patients were intubated with the McGRATH™ MAC VL • Change in mean blood pressure after intubation was significantly less in the McGRATH™ MAC VL group • The odds of hypertension were significantly reduced in the McGRATH™ MAC VL group

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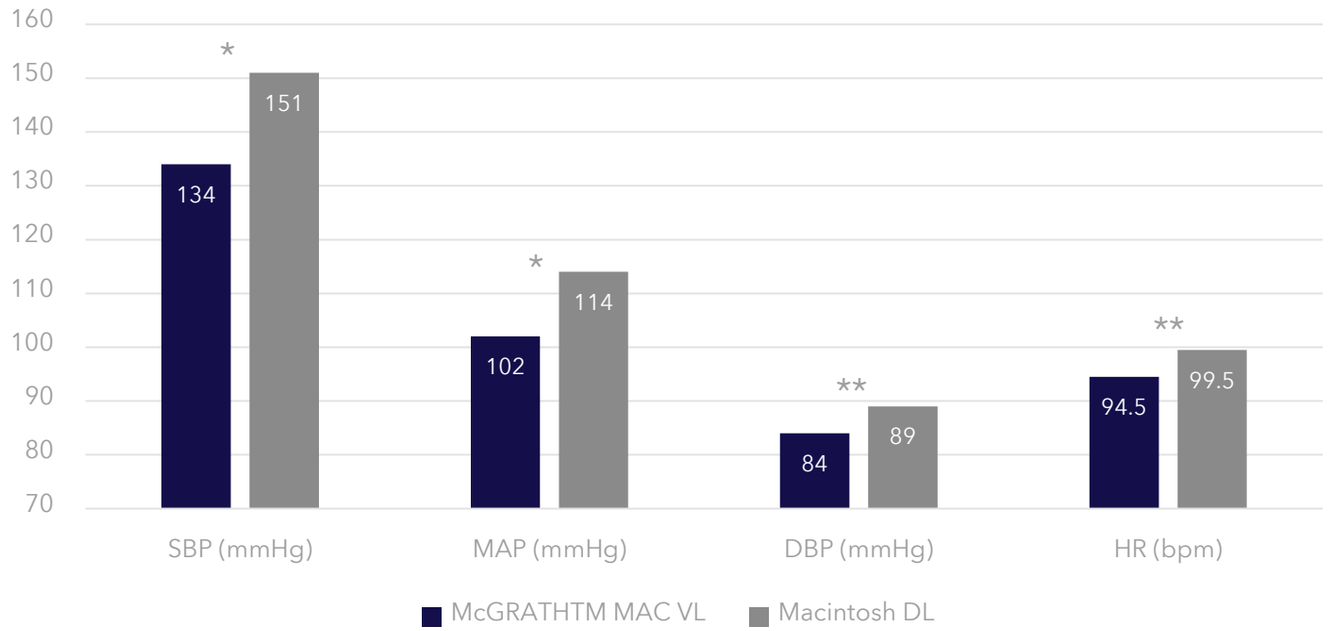
Ketata S et al.

McGRATH versus Macintosh laryngoscopes on hemodynamic response to intubation in elderly patients: a randomized clinical trial

Pan Afr Med J. 2023;45(108)

Figure 1. Hemodynamic outcomes at 1 min after orotracheal intubation



Study information	
Study design	Prospective randomized clinical trial
Methods	• **Population:** 60 patients aged over 65, ASA I or II, scheduled for elective surgery under general anesthesia. • **Groups:** Group V: Intubated with McGRATH™ videolaryngoscope, Group M: Intubated with Macintosh direct laryngoscope. • **Measurements:** Heart rate (HR), systolic (SBP), diastolic (DBP), and mean arterial pressure (MAP) were recorded at baseline, and 1, 3, and 5 minutes after intubation. Intubation time and complications were also tracked.
Results	• **Hemodynamic Response:** Both groups showed increases in SBP, MAP, and HR after intubation, but the Macintosh group (M) had significantly higher values at 1 minute post-intubation. • **Complications:** More ventricular arrhythmias occurred in the Macintosh group (4 vs 0, p<0.0001). Postoperative sore throat and hoarseness were more common in the Macintosh group (66.6% vs 33.3%, p=0.036).

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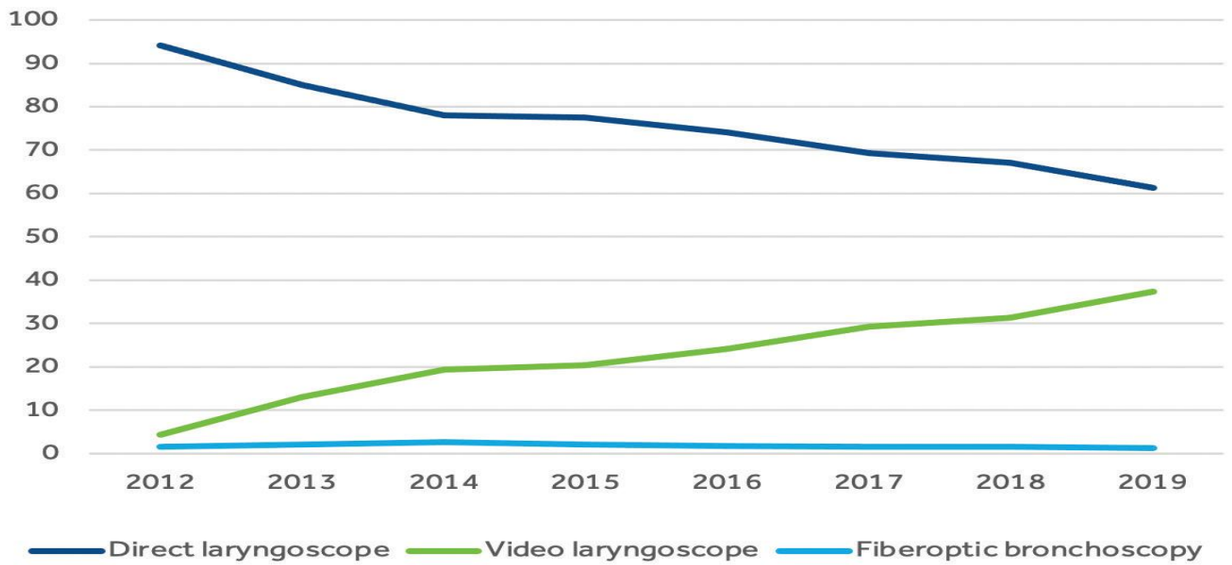
Samuels JD, et al.

Adoption of video laryngoscopy by a major academic anesthesia department

Br J Journal of Comparative Effectiveness Research 10.2 (2021): 101-108.

Figure 1. Frequency of usage by device type



Study information	
Study design	Retrospective
Methods	A single center retrospective analysis was conducted from 2012–2019 at Cornell University in New York. They reviewed data on frequency and trends in airway management devices collected from their anesthesia information management system.
Results	• During the eight year study period, there were a total of 159,447 cases where a laryngoscope was used • The percentage of cases where the DL Macintosh device was used steadily dropped from 85.6% in 2012 to 55.1% in 2019. • VL usage nearly doubled in the operating rooms and increased 2.8-times in the nonoperating room anesthesia sites. • The largest growth among devices and the driver for VL growth, was the McGRATH™ MAC VL device, which increased from 0.2% In 2012 to 36.2% of cases in 2019.

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Airway Management of Patients with Suspected or Confirmed COVID-19: Survey Results from Physicians from 19 Countries in Latin America
J Clin Med. 2022 Aug 12;11(16):4731.

Granell Gil M et al.
Airway management of COVID-19 patients: A survey on the experience of 1125 physicians in Spain
Rev Esp Anestesiol Reanim (Engl Ed) . 2022 Jan;69(1):12-24

Study information	
Study design	Multicenter surveys
Methods	Study 1: 2,411 anesthesiologists and intensivists from 19 Latin American countries completed a 37-question survey on airway management practices in COVID-19 patients Study 2: 1,125 Spanish physicians involved in the airway management of COVID-19 patients completed a 32-question survey on airway management practices in COVID-19 patients

Results

	Study 1	Study 2
Percent of patients who prefer VL for intubating COVID-19 patients (rather than DL, McCoy™, or flexible fiberscope)	64.8%	70%
Percent of patients who prefer Macintosh VL blade (as opposed to hypercurved or indifferent)	51.2%	47.4%
Percent who used VL as their primary device for intubating COVID-19 patients	37.5%	70.5%

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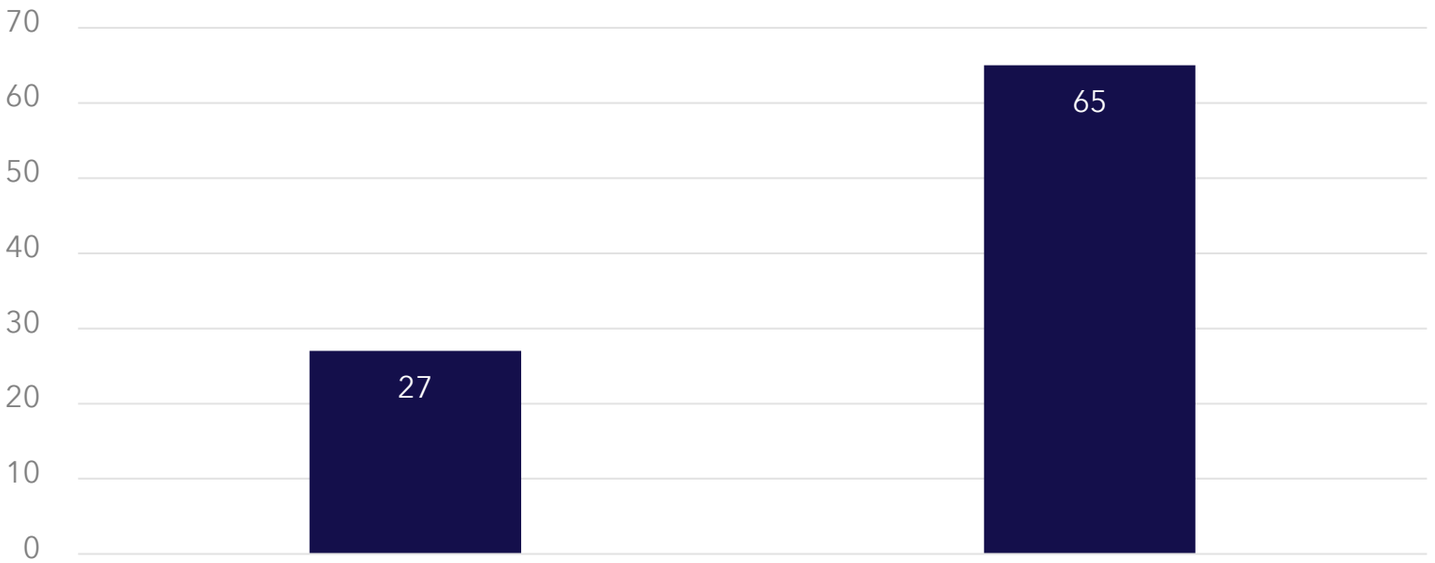
Hansel J et al.

Videolaryngoscopy versus direct laryngoscopy for adults undergoing tracheal intubation

Cochrane Database Syst Rev. Apr 4 2022;4(4):Cd011136.

Figure 1. Failed intubation (per 1,000 attempts) rate during Macintosh-style VL and direct laryngoscopy



Study information	
Study design	Systematic review and meta-analysis
Methods	• Systematic review and meta-analysis of randomized-controlled trials where patients were randomized to be intubated with either VL or DL • Endpoints included rate of successful first attempt, failed intubation, esophageal intubation, dental trauma, and hypoxemia as well as Cormack-Lehane grade and time for intubation

Results	• There was moderate quality of evidence supporting that VL reduced the rate of:
	  • Failed intubation (RR: 0.41)
	  • Hypoxemia (RR: 0.72)
	  • Low (3 and 4) Cormack-Lehane grade (RR:0.38)

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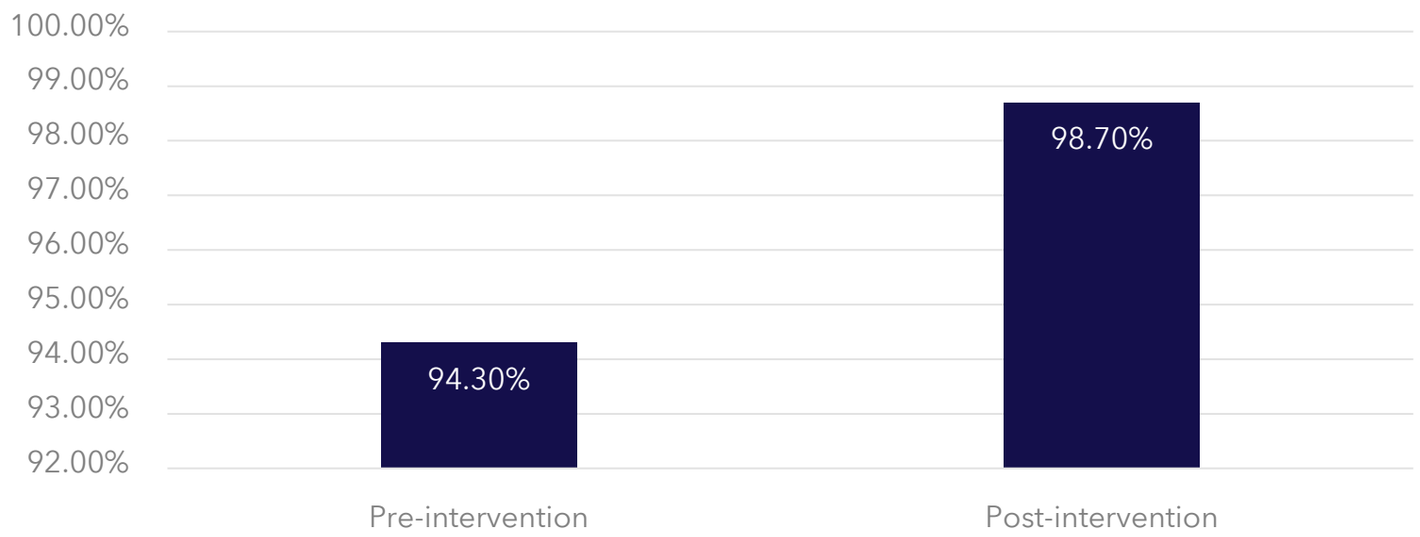
De Jong A et al.

Videolaryngoscopy as a first-intention technique for tracheal intubation in unselected surgical patients: a before and after observational study

Br J Anaesth. Jul 7 2022;doi:10.1016/j.bja.2022.05.030

Figure 1. Percent of easy tracheal intubations* during the pre-intervention and post-intervention periods



Study information	
Study design	Before and after observational study
Methods	• Two French teaching hospital implemented a quality improvement initiative that **implemented McGRATH™ MAC VL** as the first-pass technique for tracheal intubation
Results	• The study included 26,692 tracheal intubations • Rate of easy tracheal intubation increased from pre intervention to post intervention • VL was associated with less frequent need to resort to a rescue technique, improved glottic view, and reduced operator reported difficulty.

* Easy tracheal intubation met all three of the following criteria 1) Cormack & Lehane grades of I or II, 2) no difficult mask ventilation, AND 3) no need to resort to a rescue technique

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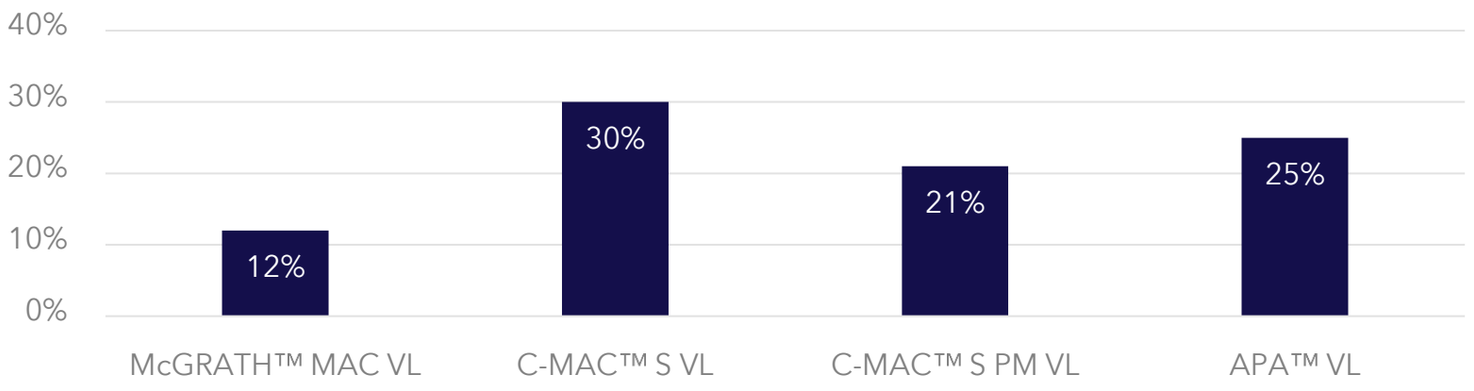
Macintosh Videolaryngoscope for Intubation in the Operating Room: A Comparative Quality Improvement Project.

Anesth Analg. Feb 1 2021;132(2):524-535

Figure 1. Percentage of patients with Cormack-Lehane score III or IV or failure of intubation at Step II



Study information	
Study design	Quality improvement trial
Methods	Four video laryngoscopes randomly selected to use in surgical patients (n=589) intubated according to two or three consecutive steps: 1. Assess Cormack-Lehane score while performing **direct** VL with Macintosh-like blade without intubation 2. Assess Cormack-Lehane score while performing **indirect** VL with Macintosh-like blade without intubation 3. Switch to hyperangulated blade; Intubation performed by a senior anesthesiologist Video laryngoscopes included: 1. McGRATH™ MAC VL (Medtronic), C-MAC-S™* (Karl Storz), C-MAC-S-Pocket™* monitor (Karl Storz), AP Advance™* (Advanced Airway Management Health Care)
Results	Compared to the other three VLs, the McGRATH™ MAC VL was associated with: 1. Less likely progression to step three* (require hyperangulated blade and senior anesthesiologist) 2. Lower Cormack-Lehane score during direct VL 3. Lower Cormack-Lehane score during indirect VL *Compared to C-MAC-S™* and AP advance™*

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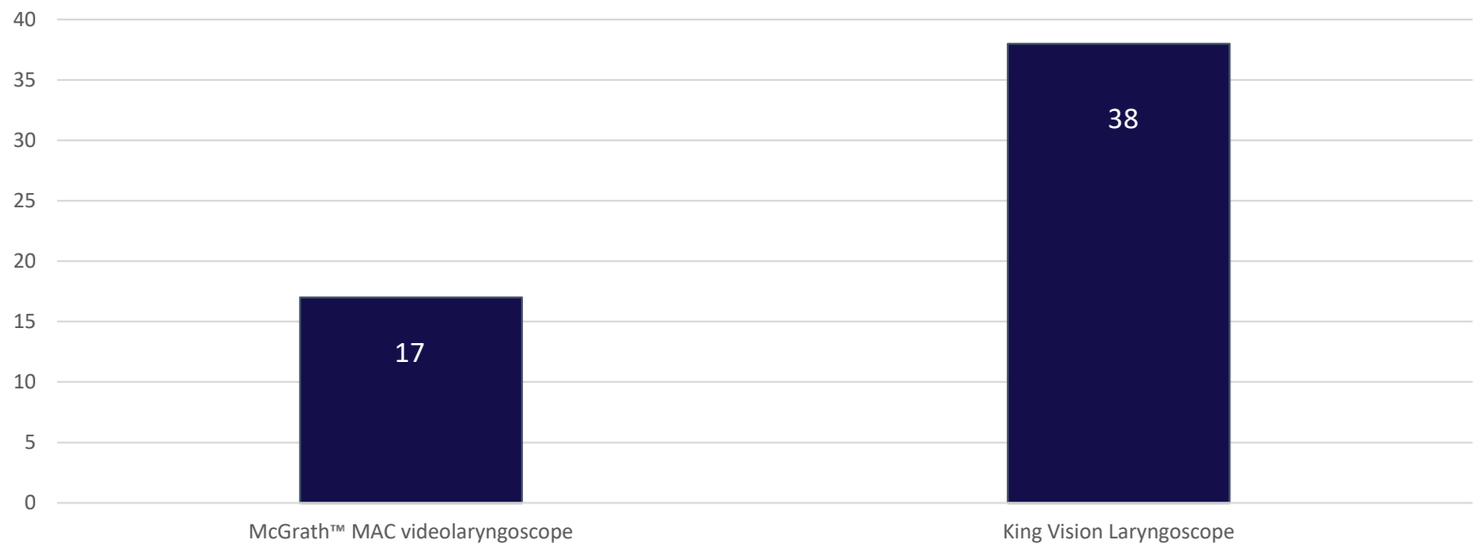
Alvis BD, et al.

Randomized controlled trial comparing the McGRATH™ MAC video laryngoscope with the King Vision™ video laryngoscope in adult patients

Minerva Anestesiol. 2016; 82(1):30-5

Figure 1. Median time for successful intubation in seconds



Study information	
Study design	Single center, single blinded, randomized controlled trial
Methods	**Participants**: 64 adults with a predicted easy airway undergoing a surgical procedure. (McGRATH™ MAC VL, n=33; KingVision™, n=31) **End Points**: Primary: First attempt success, time to intubation. Secondary: Oxygen saturation, number of attempts, Cormack grade, assist maneuvers, airway trauma. **Methods**: Operators who had performed at least 100 direct laryngoscopies and no more than 10 video laryngoscopies with the randomized instruments were allowed to perform the intubation. **Instruments (VL)**: KingVision™ VL (Channeled Blade); McGRATH™ MAC VL (#3 or #4 blade)
Results	• McGRATH™ MAC VL was associated with significantly higher first attempt success rate when compared to KingVision™ (100% vs. 77% respectively, p<0.01). • No airway traumas were observed with either instrument during this study. • No significant difference in the number of assist maneuvers or Cormak grade. • Median time to intubation was less in the McGRATH™ MAC VL group

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A Comparison of McGrath Mac and HugeMed Video Laryngoscopes in Pediatric Patients Under 3 Years Old–A Prospective Randomized Trial

Healthcare 2025; 13(7), 842

Table 1. Cormack-Lehane (CML) Score and Percentage of Glottic Opening (POGO) Value for the video laryngoscopes

	McGRATH™ MAC VL	HugeMed VL	*p**
CML Score			
1	11 (57.89%)	10 (50.00%)	*0.0034*
2A	8 (42.11%)	8 (40.00%)	
2B	0 (0.00%)	2((20.00%)	
POGO Value (%)	92.63 ± 6.09	88.75 ± 4.44	*0.002*

Study information	
Study design	Prospective, randomized controlled trial
Methods	• **Participants:** 40 pediatric patients (ASA I–III, under 3 years old) scheduled for elective surgery with general anesthesia. • **Groups:** Group McGrath (n=20): Intubated with McGRATH™ Mac videolaryngoscope. Group HugeMed (n=20): Intubated with HugeMed videolaryngoscope. • **Procedures:** Both direct and indirect laryngoscopy were performed with each device. CML and POGO scores, intubation time, number of attempts, need for optimization maneuvers, and hemodynamic parameters were recorded. All intubations were performed by an experienced anesthesiologist.
Results	• McGRATH™ MAC had a significantly lower CML score than the HugeMed (p=0.0034). • McGRATH™ MAC had a significantly higher POGO score than HugeMed (p=0.002). • No significant difference in the number of intubation attempts, success rate, complication risk, and hemodynamic parameters between the groups.

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